ALLIANCE FOR AUTOMOTIVE INNOVATION

August 11, 2023

Dr. Robert Hampshire
Deputy Assistant Secretary for Research and Technology
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, D.C. 20590

RE: Request for Information on Potential Research and Development Areas of Interest for the Advanced Research Projects Agency – Infrastructure (ARPA-I) [Docket No. DOT-OST-2023-0092]

Dear Deputy Assistant Secretary Hampshire:

The Alliance for Automotive Innovation ("Auto Innovators") welcomes this opportunity to provide comments in response to the U.S. Department of Transportation's ("Department") recent Request for Information (RFI) on the Advanced Research Projects Agency – Infrastructure (ARPA-I). Auto Innovators shares the Department's enthusiasm for this opportunity to fund innovative advanced research and development programs that develop new technologies, systems, and capabilities to improve transportation infrastructure in the U.S.

Auto Innovators represents the manufacturers that produce most of the cars and light trucks sold in the U.S., original equipment suppliers, battery makers, technology companies, and other value-chain partners within the automotive ecosystem. Representing approximately 5 percent of the country's GDP, responsible for supporting 10 million jobs, and driving $1 trillion in annual economic activity, the automotive industry is the nation's largest manufacturing sector.

Auto Innovators offers the following input on potential areas for future innovative advanced research and development programs for consideration by ARPA-I:

- **MINIMIZING VEHICLE CONFLICTS:** ARPA-I could leverage artificial intelligence (AI) or advanced intelligent transportation systems (ITS) algorithms to more effectively manage traffic flows to minimize the potential for vehicle conflicts and improve fuel economy. Further, such a project could consider researching and evaluating the potential for vehicle sensing technologies to improve real-time traffic awareness to inform the AI and ITS systems.

- **REDUCING CRASH OCCURRENCE:** ARPA-I could develop advanced analysis methods to analyze historical crash data to identify whether there are specific infrastructure design

characteristics that may create a higher (or lower) likelihood of crash occurrence.

- **UNDERSTANDING EQUITY IMPACTS AND OPPORTUNITIES:** ARPA-I could invest in targeted research to better understand the equity impacts and opportunities of autonomous vehicles (AVs) compared to other modes of transportation. Likewise, ARPA-I could investigate the impact, barriers, and opportunities posed by electric vehicles, including residential (particularly multi-family housing) and public infrastructure availability and costs, workforce development associated with electric vehicle service and infrastructure installation, operation, and maintenance.

- **PROMOTING INDEPENDENT USE OF AVs:** ARPA-I could work with industry to rapidly accelerate the development of cross-industry standards for a Wheelchair Tiedown and Occupant Restraint System (WTORS) that would allow for independent use of AVs by a wheelchair user, protecting occupants in both low-g and high-g environments and providing for interoperability between and among wheelchair manufacturers and vehicle manufacturers.

- **EXPLORING ALTERNATIVES TO GPS:** ARPA-I could explore alternatives to GPS for providing positioning, navigation, and timing (PNT) services for advanced vehicle technology. The risk of error, spoofing, jamming, and poor satellite visibility in certain settings can compromise the ability of GPS to provide PNT services in the automotive space. In addition to total alternatives to GPS, ARPA-I could research mechanisms that could be incorporated into future versions of GPS to improve accuracy and authentication against spoofing.

- **IMPROVING CHARGING INFRASTRUCTURE CYBERSECURITY:** ARPA-I could fund research to improve the cybersecurity posture of electric vehicle charging infrastructure.

- **STRENGTHENING THE RELIABILITY AND RESILIENCY OF DIGITAL TRANSPORTATION INFRASTRUCTURE:** ARPA-I could conduct research into the reliability and resiliency of digital transportation infrastructure (i.e., "smart" infrastructure) that regularly interacts with vehicles. Failures of this type of infrastructure – either intentional (e.g., a cybersecurity attack, terrorist attack, etc.) or unintentional (e.g., weather events, earthquakes, etc.) have the potential to affect the transportation system as a whole. In addition, ARPA-I could fund research to determine vulnerabilities and risks posed by quantum computing on transportation system infrastructure, including researching the cost and impact of quantum computing-powered exploits on transportation system infrastructure and identifying best practices for avoiding or mitigating such exploits.

- **REDUCING THE COST AND IMPROVING THE AVAILABILITY OF ELECTRICITY AT DIRECT-CURRENT FAST-CHARGE (DCFC) STATIONS:** ARPA-I could research ways to reduce or eliminate demand charges and avoid or minimize peak

demand electricity usage (e.g., energy storage systems). Currently, the cost of fueling electric vehicles at DCFC stations is about the same as fueling a hybrid light-duty vehicle using gasoline. Costs of DCFC stations are driven primarily by utility demand charges and could be driven higher if drivers fuel during peak demand. In addition, in order to improve accessibility and consumer safety, ARPA-I could conduct research into ways to reduce the weight of DCFC charging cables. Finally, ARPA-I could consider research to determine the number and location of DCFC stations along corridors to improve accessibility for long distance trips.

- **SUPPORTING HYDROGEN FUEL AND FUELING STATIONS:** ARPA-I could fund research to reduce the cost of hydrogen fuel and the deployment of fueling stations, particularly large-scale stations for light-, medium-, and heavy-duty vehicles along corridors. In addition, ARPA-I could invest resources into developing hydrogen hubs and finalizing standards and protocols for hydrogen fueling, including those related to equipment and flow rates.

- **IMPROVING GRID RESILIENCY:** ARPA-I could explore ways to improve grid infrastructure, reliability, and resiliency. This could include research into the grid requirements and impacts of widespread vehicle-to-grid technology that enables energy to be pushed back to the power grid from an electric vehicle battery. As we move toward higher penetration of electric vehicles, grid infrastructure will continue to emerge as a critical component of transportation infrastructure.

- **REDUCING LOGISTICAL BARRIERS AND EXPENSE OF EV RECYCLING:** ARPA-I could invest in research to better understand the cost and logistical barriers to transporting used electric vehicles and batteries. A large portion of the cost of electric vehicle recycling is transporting batteries from their location of decommission to the certified dismantling/recycling center.

Auto Innovators looks forward to further engagement with the Department on the establishment of ARPA-I to support the development of science and technology solutions that overcomes long-term challenges and advances the state of the art for transportation infrastructure in the U.S.

Sincerely,

David Schwietert
Chief Policy Officer